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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,768	11/13/2003	Jan Prochazka	10225/57 (A28)	7402
<div>7590 07/30/2010 Brinks Hofer Gilson &amp; Lione NBC Tower, Suite 3600 P.O. Box 10395 Chicago, IL 60610</div>				
EXAMINER				
FIORTO, JAMES				
ART UNIT		PAPER NUMBER		
1793				
MAIL DATE		DELIVERY MODE		
07/30/2010		PAPER		

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* JAN PROCHAZKA,  
TIMOTHY MALCOME SPITLER,  
and BRUCE SABACKY

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Appeal 2009-009334  
Application 10/712,768  
Technology Center 1700

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Before MICHAEL P. COLAIANNI, BEVERLY A. FRANKLIN, and  
KAREN M. HASTINGS, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

This is a decision on an appeal under 35 U.S.C. § 134 from the  
Examiner's final rejection of claims 1 through 5, 9 through 11, 13 through

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

15, 20 through 36, and 40 through 44, which are all of the claims pending in the above-identified application. We have jurisdiction pursuant to 35 U.S.C. § 6.

We AFFIRM.

#### STATEMENT OF THE CASE

The subject matter on appeal is directed to a low temperature process for producing pigment-grade rutile titanium dioxide. Claim 1 is illustrative:

1. A low-temperature process for producing pigment-grade rutile titanium dioxide from an aqueous solution comprising the following sequential steps:
  - a. preparing an aqueous feed solution comprising a titanium compound;
  - b. adding a catalyzing salt selected from two or more of NaCl, KCl, and LiCl to the solution in an amount from about 3% by weight of the equivalent amount of titanium dioxide to about the amount corresponding to the saturation point of the catalyzing salt in the feed solution, wherein the catalyzing salt does not significantly change chemical composition;
  - c. optionally adding a chemical control agent to the solution;
  - d. evaporating the solution to produce a dry amorphous intermediate that includes a mixture of titanium compounds; and
  - e. calcining the intermediate to form TiO<sub>2</sub> phase pure rutile pigment base at a temperature greater than a melting point temperature of the catalyzing salt and for a period of time sufficient to melt the catalyzing salt.

The Examiner maintains the following rejections:

- 1) Claims 1-5, 9-11, 13-15, 20-36, 40, 41, 43, and 44 under 35 U.S.C. § 103(a) over Duyvesteyn '530 (WO 01/00530 A1, published Jan 4, 2001);  
and

2) Claims 1-5, 13-15, 20-23, 25-27, 29-36, and 40-44<sup>2</sup> under 35 U.S.C. § 103(a) over Duyvesteyn '383 (US 6,440,383 B1, issued Aug. 27, 2002).

With respect to rejection (1), Appellants argue the claims in six groups: (1) claim 1; (2) claims 2, 3, and 40; (3) claims 9, 11, and 44; (4) claims 20-24; (5) claims 25-28; and (6) claims 30 and 31. (App. Br. 6-11 and Reply Br. 2-4).

With respect to claim groups (1) and (3) through (6), we address Appellants' arguments with respect to all of the claims in each group. *See* 37 C.F.R. § 41.37(c)(1)(vii).

With respect to claim group (2), Appellants' arguments focus on features unique to claim 3. Accordingly, we address Appellants' arguments with respect to claim 3 only. *Id.*

With respect to rejection (2), Appellants repeat arguments made in connection with rejection (1). (App. Br. 11-16). Since the disclosure of Duyvesteyn '383, which is related to Duyvesteyn '530, is substantially identical to the disclosure of Duyvesteyn '530, the claims under rejection (2) stand or fall with our decision regarding rejection (1).

*REJECTION (1): The § 103 rejection over Duyvesteyn '530*  
*Claim 1*

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<sup>2</sup> We note that the Examiner's inclusion of claims 6 through 8 in the statement of rejection at page 4 of the Answer is harmless error since it is apparent from record that these claims have been canceled. (*See* App. Br. 3 and 6; *see also* amendment dated February 5, 2007).

## ISSUE

Did the Examiner err in determining that Duyvesteyn '530 would have rendered obvious the claimed process for producing pigment-grade rutile titanium dioxide comprising step b as required by claim 1? We decide this issue in the negative.

## FINDINGS OF FACT (FF)

We adopt the Examiner's findings in the Answer and Final Office Action as our own, except as to those findings that we expressly overturn or set aside in the Analysis that follows. We add the following factual findings:

1. The Specification discloses that

The catalyzing salt . . . remains chemically stable and does not react with titanium compounds in the temperature range used in the present process, generally 300-800°C. . . . It is believed, that besides their catalytic effect, the salts may also function as fusing, mass transfer, and spacing agents. . . .

The catalyzing salt that can be used in the present invention includes pure compounds of NaCl, KCl, LiCl or any mixture of these salts or other pure chloride salts.  
(Spec. ¶¶ [0036] and [0037]).

2. Duyvesteyn '530 teaches that "minor quantities of chemical control agents may be introduced into the titanium chloride solution to control the physical and mineralogical characteristics of the solid titanium dioxide product resulting from the conversion of the solutions."  
(Duyvesteyn '530, p. 6).

Additional findings of fact may appear in the Analysis that follows.

## PRINCIPLES OF LAW

As stated in *In re Best*:

Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. *See In re Ludtke, supra*. Whether the rejection is based on 'inherency' under 35 U.S.C. § 102, on 'prima facie obviousness' under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products.

562 F.2d 1252, 1255 (CCPA 1977) (footnote omitted).

"[W]hen a [prior art] patent 'simply arranges old elements with each performing the same function it had been known to perform' and yields no more than one would expect from such an arrangement, the combination is obvious." *KSR Int'l Co., v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (*quoting Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976)).

"[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980).

#### ANALYSIS AND CONCLUSION

Appellants argue that the Examiner erred in rejecting claim 1 over Duyvesteyn '530 because Duyvesteyn '530 does not recognize claim 1's step b. (App. Br. 6 and 7). In this regard, Appellants argue that "DI [Duyvesteyn '530] does not recognize the use of a catalyzing salt that does not significantly change chemical composition" as required by claim 1. (App. Br. 7-8). Appellants also argue "DI teaches only that minor quantities may be added, but there is no mention in DI about what constitutes a minor quantity." (App. Br. 7). In addition, Appellants argue that "DI does not

mention that it is the aggregate of the two or more of NaCl, KCl, and LiCl that must be present in an amount from about 3% by weight of the equivalent amount of titanium dioxide." *Id.*

In addition, Appellants argue that the Examiner erred in relying upon *In re Boesch* since "the facts in *In re Boesch* differ from those in the present application." (App. Br. 8). Specifically, Appellants argue that *In re Boesch* may be applied when the prior art teaches "the same constituents in amounts where each of the ranges of constituents in the claimed alloys overlap[ ] ranges disclosed by the prior art." (App. Br. 8).

With respect to the "adding a catalyzing salt selected from two or more of NaCl, KCl, and LiCl" feature required by claim 1's step b, as correctly found by the Examiner at pages 4 and 6 of the Answer, Duyvesteyn '530 teaches that "chemical control . . . agents [corresponding to the claimed catalyzing salt] can be . . . chloride salts of lithium, sodium, [and] potassium." (*See* Duyvesteyn '530, p. 6). In addition, Duyvesteyn '530 teaches the use of "minor quantities" of chemical control agents. (FF 2).

Thus, we agree with the Examiner's determination that "it would have been obvious to form the catalyzing salt as a mixture of two or more of NaCl, KCl, and LiCl, since Duyvesteyn 530 teaches that minor quantities of chemical control agents may be introduced into the titanium chloride solution to control the physical and mineralogical characteristics of the solid titanium dioxide product." (Ans. 4; *see* FF 2).

Moreover, employing a mixture of two or more of NaCl KCl, and LiCl would have been nothing more than the predictable use of prior art elements (i.e., chloride salts) according to their established function

(e.g., to control the physical and mineralogical characteristics of the titanium dioxide product). *KSR*, 550 U.S. at 417.

With respect to the amount of catalyzing salt required by claim 1, in reference to our above discussion, the Examiner relies upon Duyvesteyn '530's teaching that "minor quantities of chemical control agents may be introduced into the titanium chloride solution to control the physical and mineralogical characteristics of the solid titanium dioxide product." (Ans. 6; *see* FF 2).

In other words, Duyvesteyn '530 teaches that the amount of chemical control agents (corresponding to the claimed catalyzing salt) is a result effective variable that affects the physical and mineralogical characteristics of the solid titanium dioxide product.

Thus, we agree with the Examiner that determining the optimum amount of chemical control agents (corresponding to the claimed catalyzing salt), including an amount within the range required by claim 1, via routine experimentation would have been within the ambit of one of ordinary skill in the art and, thus, would have been obvious. *See In re Boesch*, 617 F.2d 272, 276 (CCPA 1980).

With respect to Appellants' argument that *In re Boesch* is not applicable to the present situation, *Boesch* plainly states that its holding is in "accord[ance] with the rule that discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill in the art." *Boesch*, 617 F.2d at 276 (*citing with approval In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (stating that "it is to be expected that a change in . . . concentration . . . [is] an unpatentable modification. . . . where the general conditions of a claim are disclosed . . . it is not inventive to discover the



optimum or workable ranges by routine experimentation." ). Accordingly, Appellants' argument is without persuasive merit.

With respect to the "catalyzing salt does not significantly change chemical composition" feature required by claim 1, in reference to our above discussion, the Examiner correctly determines that Duyvesteyn '530 renders obvious the claimed chemical control agents (corresponding to the claimed catalyzing salt) selected from two or more of NaCl, KCl, and LiCl.

Thus, because the Examiner determined that Duyvesteyn 530's chemical control agents (corresponding to the claimed catalyzing salt) was virtually identical to Appellants' catalyzing salt, the burden was properly shifted to Appellants to prove that Duyvesteyn 530's chemical control agents (corresponding to the claimed catalyzing salt) do not possess the claimed characteristic (i.e., the catalyzing salt does not significantly change chemical composition). *See Best*, 562 F.2d at 1255. However, on this record, Appellants have not done so.

Thus, it follows that the Examiner did not err in determining that Duyvesteyn '530 would have rendered obvious the claimed process for producing pigment-grade rutile titanium dioxide comprising step b as required by claim 1.

### *Claim 3*

Appellants argue that a prima facie case of obviousness has not been established because claim 3 "requires washing, milling, and dispersing the rutile pigment. As the Examiner acknowledges, however, D1 [Duyvesteyn '530] requires milling and then washing, which is opposite [to] the process required by the present claim." (App. Br. 9). We disagree.

While claim 2 recites "washing the salt from the calcined TiO<sub>2</sub> rutile pigment base" and claim 3, which depends from claim 2, recites "milling and dispersing the TiO<sub>2</sub> rutile pigment," claim 3 based on its plain meaning does not impose a specific order on the performance of these washing, milling, and dispersing steps.

Instead, claim 3 only requires performance of these washing, milling, and dispersing steps, which, for example, encompasses a washing step occurring before or after the milling and dispersing steps.

Indeed, as correctly stated by the Examiner "[the claims] do not require the steps of washing, milling, and dispersing the rutile pigment to be in any particular sequence." (Ans. 6).

Accordingly, Appellants' arguments are unpersuasive of reversible error.

#### *Claims 9-11 and 44*

Appellants argue that "there is simply no suggestion in D1 or elsewhere to use the claimed eutectic mixture." (App. Br. 9).

In reference to our above discussion, we agree with the Examiner's determination at pages 3, 4, and 7 of the Answer that determining the optimum amounts of chemical control agents, including amounts that form a eutectic mixture as required by claims 9-11 and 44, via routine experimentation would have been well within the ambit of one of ordinary skill in the art and, thus, would have been obvious. *See In re Boesch*, 617 F.2d 272, 276 (CCPA 1980).

In an attempt to rebut the Examiner's prima facie case of obviousness, Appellants allege that "the unobvious advantages resulting from the use of a

eutectic mixture have been explained above and in the specification. These surprising and unexpected advantages are not taught or appreciated by D1." (App. Br. 9 and 10). In this regard, Appellants allege that "it is believed that the catalyzing salts most likely improve mass transfer, provide spacing required for rutile growth to the right particle size in an open network macrostructure, and create ideal conditions for wetting and fusing in the crystal growth process, especially after they melt (para. [0055])." (App. Br. 7 and 8).

In other words, Appellants argue that the catalyzing salt's effect on crystal growth is an unexpected result.

In reference to our above discussion, Duyvesteyn '530 teaches that the "chemical control agents may be introduced into the titanium chloride solution to control the physical and mineralogical characteristics of the solid titanium dioxide product resulting from the conversion of the solution." (FF 2). In addition, Duyvesteyn '530 teaches that chemical control agents may be used to "promote and control conversion of the oxide to [titanium dioxide having] the desired crystal structure and other physical characteristics such as crystal size and millability." (Duyvesteyn '530, p. 8).

Therefore, given that Duyvesteyn '530 recognizes that its chemical control agents (catalyzing salt) control physical characteristics such as the *crystal size* of its titanium dioxide product (the TiO<sub>2</sub> phase pure rutile pigment base), we determine that Appellants' arguments and evidence that the catalyzing salt's effect on crystal growth (e.g., crystal size) merely establish expected results.

*Claims 20-24*

With respect to claim 24, Appellants argue that "D1 does not suggest the use of any calcination temperature less than 400° C. In addition, the rejection provides no basis for rejecting this claim and thus, it cannot stand." (App. Br. 10).

Appellants, however, do not specifically dispute the Examiner's finding and thus fail to identify error in the Examiner's stated case, which is that "[t]he prior art would require the product be calcined at a temperature less than 400 degrees C, since it would have to pass through the temperature range of less than 400 degrees C in order to be calcined at temperatures greater than 450 degrees C." (*Compare* Ans. 7 with App. Br. 10 and Reply Br. 2-4).

Accordingly, Appellants' arguments are unpersuasive of reversible error.

With respect to claims 20-23, Appellants refer to arguments made in connection with claim 1. (App. Br. 10). For the reasons discussed above, we find these arguments unpersuasive of reversible error.

*Claims 25-28*

With respect to claims 27 and 28, Appellants argue that "the final rejection does not mention a calcination time of either less than about 30 minutes or less than about one minute . . . Without any mention of these limitations, a *prima facie* case is not established." (App. Br. 10-11).

In reference to our above discussion, Duyvesteyn '530 teaches a calcination step in order to "convert the amorphous oxide to titanium dioxide

of the desired crystal structure." (Duyvesteyn '530, p. 8). Duyvesteyn '530 teaches in its embodiments that this calcination step may last one hour, two hours, or 90 minutes. (Duyvesteyn '530, pp. 8-9). In other words, Duyvesteyn '530 teaches that the calcining time is a result effective variable that affects the crystal structure of the titanium dioxide product.

Thus, we agree with the Examiner that determining the optimum time, including the time within the range required by claims 27 and 28, via routine experimentation would have been well within the ambit of one of ordinary skill in the art and, thus, would have been obvious. (Ans. 7) *See In re Boesch*, 617 F.2d 272, 276 (CCPA 1980).

With respect to claims 25 and 26, Appellants refer to arguments made with in connection with claim 1. (App. Br. 10-11). For the reasons discussed above, we find these arguments unpersuasive of reversible error.

#### *Claims 30-31*

Appellants argue that "while DI [Duyvesteyn '530] discloses the use of  $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$  [at page 11] in an amount to provide 6.3% Sn as wt% in  $\text{TiO}_2$ , the  $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$  is not one of the claimed chloride salts and it significantly changes its chemical composition contrary to the limitations required by claim 1." (App. Br. 11). The Examiner, however, does not solely rely on Duyvesteyn '530's embodiment of  $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$  to meet the disputed claim feature.

In this regard, the Examiner finds and Appellants do not specifically dispute that Duyvesteyn '530, like Appellants, teaches the use of a tin chloride (Ans. 8). In other words, though Duyvesteyn '530 exemplifies using the hydrated form of tin chloride, Duyvesteyn '530 broadly discloses the genus of tin chloride, which includes anhydrous tin chloride, as a

chemical control agent. (*See* Duyvesteyn '530, p. 8 and Spec. ¶ [0040]).  
Accordingly, Appellants' arguments are unpersuasive of reversible error.

#### ORDER

In summary, rejections (1) and (2) are sustained.  
Accordingly, the Examiner's decision is affirmed.

#### TIME PERIOD

No time period for taking any subsequent action in connection with  
this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(2009).

AFFIRMED

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